Learning in a Demand Chain Management Framework: Directions for Business Education

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50Word Abstract

This paper addresses some emerging educational needs and approaches along dimensions of demand chain management, dynamic performance measurement (both in business and university settings), and a cross-functional approach to learning. Several evolving automated information sharing capabilities are identified which, through the creation of knowledge-based partnerships, are deployable in business-educational processes.

Abstract

The claim is made that many of today's evolutions in business management, characterised by new ways of knowledge creation in a collaborative, multi-disciplinary environment, are not yet adequately reflected in business college education. This paper addresses some emerging educational needs and approaches along dimensions of demand chain management, dynamic performance measurement (both in business and university settings), and a cross-functional approach to learning. Furthermore, a need was identified to expose business students to modern business software interfaces, and a critical analysis of the underlying methodologies used in these systems. The paper then identifies a number of evolving automated information sharing capabilities, which, through the creation of knowledge-based networks of partners, can be deployed in the business educational process.

Keywords: cross-functional learning, business education, e-knowledge networks, demand chain management

Introduction

Learning today is highly dynamic. The most important task of management is to create an environment supportive of group activity, innovation and the creation of new knowledge (Jarvinen et. al., 2001). The ability of organisations to gather, manage and produce knowledge constitutes the basis of 'the learning organisation', or 'the new knowledge-creating organisation', or 'the learning laboratory'. 'The learning organisation is concerned with individual learning, and this is harnessed to create organisational learning' (Hamilton, 2002). Increased flexibility is another key trend of the learning organisation. The main avenues to increased flexibility include – 'quantitative flexibility' (the ability to alter size to match changes in demand), 'operational flexibility' (the ability to reorganise functions and tasks in many ways), and 'outsourcing' (the ability to share tasks in-line with fluctuations in demand and production)(Johnson and Pyke, 2000; Vollmann et. al., 2000).

Organisations are redesigning their internal structure and their external relationships, creating new knowledge networks to facilitate improved communication of data, information, and knowledge, while improving coordination, decision making, and planning (Warkentin et. al., 2001). Knowledge networks allow participants to create, and use strategic knowledge to improve operational and strategic efficiency and effectiveness. As such, the knowledge building requirement is not confined to the organisation itself, but transcends to the network of organisations the firm belongs to, and may eventually lead to the building of knowledge about the production of goods and services, and the organisation of this production among the collectivity of firms, referred to as "network capabilities". Previous authors ascertain that "the goal of creating a knowledge culture with willing collaboration cannot be achieved without networks that work" (Foss, 1999). Linked to tapping into the knowledge base is the need to clearly communicate business goals as key enablers for any business improvement initiative (Sheldon, 1997). This is also addressed by Selen (2000) in a framework of resource-based competitive environments, where individual learning culminates in organisational learning, across networks of firms. Fahey and Prusak (1998) point out the danger of an exaggerated emphasis on knowledge stock, rather than knowledge flow or knowledge sharing. Today, with the continuing evolution of e-commerce (particularly in the back-office), e-knowledge networks are evolving "in every economic sector in support of business-to-consumer commerce, business-to-business commerce, government-to-citizen interactivity, peer-to-peer exchanges, and internal connectivity through intranets" (Hackney et. al., 2000; Marshall and McKay, 2000). Furthermore, the main characteristic of these emerging networks is an automated exchange of rich customer knowledge by unattended computer systems, programmed to capture and evaluate knowledge with data mining algorithms (Warkentin, et. al., 2001).

Many of these evolutions, in light of new ways of knowledge creation in a collaborative, multi-disciplinary environment, are not yet adequately reflected in business college education. Yet learning at business schools is undergoing change as well. Networks of collaborating business schools and universities are emerging, and are expected to grow as a result of i.e. the harmonisation of educational requirements and the need for greater mobility among educational institutions (i.e. the so called "Bologna"-declaration by the

European education ministers). Furthermore, we notice a shift from a teaching towards a learning environment, with continuing developments in flexible learning options and on-line delivery of subjects. In this respect, some leading schools such as MIT have made some of their basic subjects freely available on the net.

Curriculum wise, however, many business schools may not be fully addressing the learning needs inherent to the rapidly changing industry developments, where the way business is conducted is being redefined by e-business dynamics on an ongoing basis. The reasons for this may be found in the rigid organisational structure of university settings, changing and decreasing funding schemes, a traditional and outdated methodology, and lack of collaboration within and outside the business school environment. While the above picture may appear somewhat polarized and exaggerated, today's developments present countless opportunities for re-alignment of learning objectives and methodologies, as well as substantial growth.

This paper attempts to identify some of the deficiencies of today's learning environment and knowledge building in business school education, and proposes suggestions for positive change that is in line with the changing business environment and evolving e-knowledge networks.

As a first observation, business education needs to be put within a framework of demand chain management, which increasingly dictates modern business management. Essentially, demand chain management is a set of practices aimed at managing and coordinating the whole demand chain, starting from the end customer and working backward to raw material suppliers. There are two fundamental objectives: (1) to develop synergy along the whole demand chain, and (2) to start with specific customer segments and meet their needs rather than focus on internal optimisation" (Vollmann et. al., 2000). The focus is clearly customer-centric, as defined early on by Brace, (1989), in explaining the concept of a demand chain as "*... the whole manufacturing and distribution process may be seen as a sequence of events with but one end in view: it exists to serve the ultimate consumer*."

As a second observation, the management process needs to be revisited in terms of dynamic performance measurement and the link with double-loop learning. Furthermore, modern management requires a cross-functionally trained workforce, a prerequisite that is insufficiently, if at all, addressed in many business curricula. Thirdly, business students need to be exposed to and become familiar with modern business- and collaborative commerce-software interfaces, along with a critical analysis of the underlying methodologies used in these systems. This latter point has recently been emphasised, with a clear warning against the use of existing business methodologies out of context in optimising the value chain (Selen, 2002). These perspectives highlight the need for business school education to continue to re-align itself with today's and tomorrow's business needs, as well as form the basis for continued re-engineering of its "organisational learning structure" to create value for the business graduate.

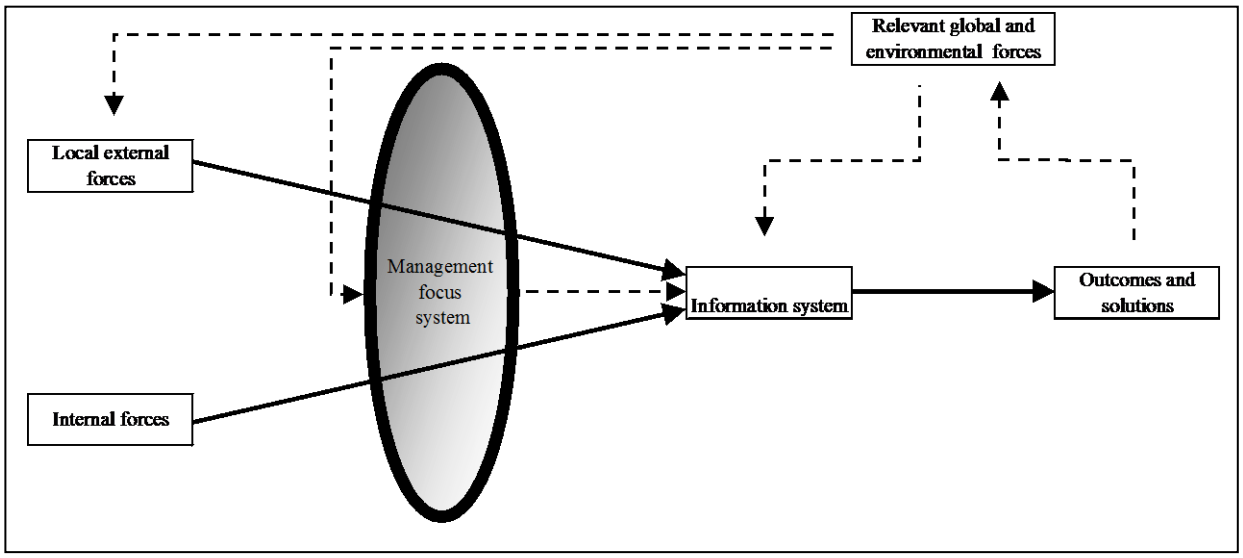
A Demand Chain Management Perspective to Learning

The demand chain management concept is fundamentally different from the supply chain management concept. Demand chain management is essentially a set of practices aimed at managing and coordinating the whole demand chain, starting from the end customer and working backward to the raw material suppliers. There are two key objectives: (1) to develop synergy along the whole demand chain, and (2) to start with specific customer segments and meet their needs rather than focus on internal optimisation (Vollmann, et. al., 2000). A supply chain is essentially a streamlined pipe that processes raw materials, transforms them into finished goods, and delivers them to the customers. A demand chain is much more complicated. Here the business units are supplied by and supply a multitude of other business units, with third-party providers supporting the linkages between them (with transportation, warehousing, logistics, manufacturing, planning and control systems linkages, and information management). In demand chain management the bundles of goods and services are customised for every customer segment and each individual. Furthermore these bundles are continuously changing due to system improvements between customers and suppliers. Demand chain management can also be extended to the service sector (Anderson and Morrice, 2000), such as the real estate industry (Selen, 2001).

The e-business dimension underlying the demand or value chain forces management to re-think their processes, so as to integrate them with the organisation's strategy and operations management. The focus will increasingly be on how to manage networks, rather than complex organisations. Key features of this demand chain framework include an integrated network of modern management tools and applications, such as selling-chain management, customer relationship management, business intelligence, enterprise application integration, enterprise resource planning, and supply chain management. These evolutions will dictate a new business paradigm to which our knowledge building systems must respond. Currently, some business schools have already responded by adopting a supply chain management teaching approach, designed to "continuously redefine the nature of manufacturing activities and enterprises by changing the requirements for manufacturing excellence and the appropriate organisational responses" (Vollmann, et. al., 2000) Today supply chain management is largely being replaced by demand chain management, because the chain is perceived to commence with the customer and work backwards, instead of starting with the supplier or manufacturer and working forwards. Demand chain management instruction integrates several key areas: faultless execution (programs linked to deliver desired outcomes for all those involved, and at all levels), customer driven focus (student centered learning), outsourcing and supply base development (strategic links with industry, other task providers, and specialist instructors), and partnership implementation (strategic links with relevant industry bodies, qualifications providers, all levels of government). This ambitious method is dictated by the distinct needs of the customer while focusing on a specific business unit. For example, outsourcing and supply base development are concerned with core competencies and the choices that need to be made by the firm to focus its resources, while customer and supplier partnerships focus on improving agendas within the demand chain. This Demand Chain Learning Framework Model (adapted from Hamilton, 2002) is readily adapted to the tertiary education sector, and is illustrated in Figure 1. The local

internal forces operating within the university include those related to integrated programs and delivery at all levels. This area can be further subdivided in specific areas including training courses, finance, instruction, and students. For example, when delivering an e-business training course all aspects of the program should be designed to meet the needs of the students. This is governed by financial constraints, IT constraints, instruction constraints, support constraints, student backgrounds and skills, etc. These factors must be evaluated, incorporated and used within the instructional program. The e-business program would include theory, practice, skills development, specific solutions desired, real business scenarios, solution options and evaluations, etc. These areas would not be textbook driven, but would be designed, and strategically aligned under lecturer/expert guidance to meet customer/client and student current and perceived future needs. This may require a major mind-shift for many lecturers, but it provides real and deep learning. Here, students explore, test, develop, and evaluate 'best' solutions. These demand chain business related tertiary courses aim to provide competitive advantage, to benchmark to ensure continuous improvement, and to measure outcomes.

Figure 1: Demand Chain Learning Framework Model



(Source: Adapted from Hamilton, 2002)

The local external forces include community support and involvement, support from all levels of government – local to national, business support, client/student business support. These external organisations will only participate if they recognise an added-value position for their operation or segment. Hence, the tertiary institution must drive real interaction, and involvement with each external entity. Possibilities include partnerships and joint venture approaches with selected industry leader, to increase the knowledge base and ensure closeness to industrial problems, strategies, demands, and the like. In e-business, for example, businesses may benefit from free or cheap consultations,

development of database management systems, task programming, and web sites. In return, the learning institution acts itself as a demand chain provider and also offers publicity, project assistance, and advice.

Thus far, the model has only two components – internal and external forces. These are now linked via the tertiary training institution's management focusing system. This system acts as a lens and focuses the appropriate program into the appropriate information system network. Here library services, research and management information are housed in the 'state of the art' knowledge management system (KMS). The KMS incorporates the data warehouses, external information sources, communications devices, and business intelligence tools. Combined these deliver intelligent information in real-time. This area is under constant renewal in the demand chain model. Student and instructors can thus leverage the KMS to enhance outcomes.
As such, learning solutions are outcome- focused, producing a highly skilled graduate who should possess the requisite knowledge, skills, attitude, and higher order thinking skills that match the current and immediate future needs of the global business community.

Real and perceived global challenges are mapped one (short term), three (medium term), and five (long term) years into the future to ensure strategic directions, latest skills, resources, training, etc are on task. These are mapped at individual, group and organisational levels (Smart et. al.,1997; Cameron, 1978,1981). By adopting this demand chain team approach, the educational outcomes produce explicit solutions and codify needs more accurately.

Some organisations utilise single loop learning – they learn 'know-why or know-how or know-what, without analysing the underlying values. Errors are corrected using past routines and present policies as the feedback mechanism. Learning in a Demand Chain Management framework requires double feedback loops to correct errors, by modifying the learning objectives policies and routines (Argyris, 1976), and by activating participants to learn know—why, know-what and know-how, all simultaneously. This demand chain learning framework model encompasses integrated learning processes, change management and strategic initiatives. It provides reinforcement to managers, instructors, students and technicians. It also provides a confident means to upgrade, modify or change the relevant learning processes. The learning processes may also involve action learning (with endless variations possible), action science (with rigorous in-depth analysis) and/or action thinking (with in-depth thought and mind models) to generate solutions (Schlesinger, 1996).

Many business curricula offer advanced courses in each of the "traditional" functional areas of accounting/finance, marketing, operations, and management (human resources), and nowadays as to be expected, e-commerce. What seems to go astray, though, is the lack of integration of all these learning modules in relation to evolving overall business models and strategies. Although many business educators will advocate integration in their subjects, very few actually know what is exactly taught and learned in each step "along the way". One of the reasons for this may be the lack of advanced integrated

business software that is deployable in regular class meetings; another is the lack of dynamic planning. If business school education is to adequately prepare graduates, the entire learning process should be put in perspective and be coupled to the demand chain framework described earlier. Fragmented subjects that "teach" basic knowledge in each of their areas will loose the added value of education that is sought at the university level, if not embedded in an overall framework of cutting edge business models and practices. Aside from a newly emerging business model, new dynamic performance measures are introduced as part of assessing business performance in a larger context than just the firm as such. Business school education needs to respond to these evolutions as part of the integrative framework suggested before. Moreover, many business schools may want to revisit their own performance measurement system in terms of learning outcomes of their graduates, beyond the subject and instructor evaluations currently in use. This may include new performance measures that test skills and learning outcomes in real-life situations (internships), how well and comprehensive the learning process has advanced in terms of objectives set out from the start, examination panels with business practitioners, etc. (Selen, 2001).

Table 1 illustrates different dimensions Owlia and Aspinwall (1996) propose along which to measure, and improve quality, in the higher education environment.

Table 1: Quality Measures in Higher Education

Dimensions	Characteristics	Customers
1. Tangibles	sufficient equipment/facilities modern equipment/facilities ease of access visually appealing environment support services (accommodation, sports, ..)	students, staff
2. Competence	sufficient academic staff theoretical knowledge, qualifications practical knowledge up-to-date teaching expertise, communication	students, staff
3. Attitude	understanding students' needs willingness to help availability for guidance and advice giving personal attention emotion, courtesy	students
4. Content	relevance of curriculum to the future jobs of students effectiveness containing primary knowledge/skills completeness, use of computer communication skills and teamworking flexibility of knowledge, being cross-disciplinary	students, staff, employers
5. Delivery	effective presentation sequencing, timeliness consistency fairness in examinations feedback from students encouraging students	students
6. Reliability	trustworthiness giving valid award keeping promises, match to the goals harnessing complaints, solving problems	students, staff, employers

Source: Adapted from Owlia, et. al., 1996.

The Need for Dynamic Performance Measures

The use and importance of appropriate business performance measures was recently discussed (Neely, 1999) along two main dimensions: why is business performance measurement on the agenda, and second, what are the current issues that challenge managers and researchers. The author points out seven reasons why performance measurement has come to the foreground: "the changing nature of work; increasing competition; specific improvement initiatives; national and international quality awards; changing organisational roles; changing external demands; and the power of information technology". In answer to the second dimension, nine main topics were identified:

- What are the determinants of business performance?
- Can the relationship between different dimensions of business performance be mapped?
- Can predictive performance measures, or leading indicators, be identified?
- What are the strengths and weaknesses of the various performance measures proposed in the academic and practitioner literatures?
- How valid is each of these measures?
- Does the appropriateness and validity of the measures vary according to the country and cultural setting?
- How can measurement systems be implemented?
- How can measurement systems be used to manage business performance?
- How can the evolution of measurement systems be managed over the long term?

The above questions highlight the complexity of the issue of performance measurement and the traditional "bottom line". Furthermore, the author states that the topic does not belong to accountants, operations managers, business strategists, human resource managers or marketers. He continues to state that "the biggest hurdle facing the field is that few academics cross these functional boundaries……academics in different disciplines talk different languages…..substantive breakthroughs are likely to arise when these academics learn to talk and work with one another."(Neely, 1999). The issue only gets more acute when put in a supply/demand chain-framework, as stated by Beamon (1999): "the process of choosing appropriate supply chain performance measures is difficult due to the complexity of these systems". The author states further that many of the existing (supply chain) models use inappropriate or ineffective performance measures that are limited (non-inclusive). By limiting the scope of the performance measurement, these models ignore important performance trade-offs. The author continues by saying that "the effects of these performance trade-offs are magnified when the supply chain is reconfigured on the basis of a non-inclusive measurement system". Practitioners also point towards the need for more extended performance measures. In a recent article (Schultz, 2000), William Walker of Agilent Technologies, a spin-off from Hewlett-Packard Co., is quoted to say "people have to change their mindset from trying to measure locally to measuring globally across the entire supply chain, end to end". These issues of change and culture follow "many, many years of ingrained behavioral and functional measurement in locally optimising the company".

Business school curricula should adhere to an overall business model that is founded on a demand chain framework when teaching today's modern bottom line measurements and the company's performance (which implicates the relevant business strategy pursued). Often business schools themselves fall prey to sticking to a functional approach when looking at company performance, and little is done to cross over to other areas within a holistic (demand chain) business model framework. Yet business educators have done substantial research in developing more comprehensive models, but this is not (yet) reflected in many business curricula. The former discussion re-emphasises the need for double-loop learning, which corrects errors in ways that involve the modification of the organisation's objectives, policies, and standard routines, using dynamic (as opposed to static) performance measures to guide and (re)align the learning process.

Cross-functional management learning

It is clear that business education is a multi-functional task, encompassing areas of people management, accounting/finance, operations, marketing, and information technology. Creating a renewed framework of learning that addresses all these areas, together with fundamental education in non-related areas such as history, arts, science etc. to allow for an all-round educational process, constitutes in itself a roadmap for lifelong learning, and cannot be adequately captured in a formal business curriculum of 3-5 years. How then are we to implement fundamental changes in learning at business schools, without losing track of the practical facts of life? Universities must balance a variety of seemingly contradictory pressures and demands in order to perform effectively. In this, they are no different from most other organisations (Quinn et. al., 1988). A different type of leadership is required. Academic leadership should be 'dispersed leadership' (Ramsden, 1998; Rowley, 1997; Coleman, 1994). Pounder (2001) suggests the desired leadership model for universities is transformational leadership – where a shared commitment to a vision is a central tenant. In this model, the instructor needs to be a mentor or facilitator – one who cares for the students' welfare, but also one who displays entrepreneurship, innovation and an acceptable level of risk taking. This suggests a re-alignment of learning objectives and development of new learning processes along the following dimensions, as recently elaborated on by Selen (Selen, 2001):

- study of existing and emerging business models for different industries
- study of generic business skills
- general education requirements
- specialised skill development within an integrated business model (paradigm)

The main concepts underlying these dimensions are briefly summarised below.

Existing and emerging business models

The generic business model (and emerging models as a result of e-business developments) should drive the subsequent learning content, and eventual specialisation. One should make sure, with the advent of global demand chains, that our traditional functional framework is not expanding into demand chain functions (i.e. demand chain explained in operations, demand chain explained in marketing, without reference to the "same" demand chain framework to which the learning modules in operations and marketing refer).

Generic Business Skills
When developing future learning strategies and processes, business education in particular should not lose sight of the need to develop generic business skills. These may include selected language skills, business writing and computing skills, legal skills, a cultural awareness, ethics and value systems, interviewing skills, and the like. In the past, some of this skill development at universities was deemed of an "inappropriate" (low) level, resulting in graduates that were lacking mastery of basic skills such as business writing. These anomalies need to be eradicated in learning systems of the future.

General Education Requirements
Conducting business in a global environment requires future business learners be exposed to tools for educating themselves in areas that are peripheral to the business context (i.e. cultural dimensions). The learning dimension here should focus on learn-how-to-learn, rather than addressing the multitude of issues one can confront in a professional career, which is too comprehensive to result in useable learning outcomes. Business schools are addressing these issues through curriculum reform (i.e. US business schools which bring in a "liberal arts" component to the curriculum, and thereby broaden the student's background outside of the area of business, including history, culture, languages …), and by moving their students around the globe in dedicated study/exchange programs. Such development should become more of a standard, and alternate ways of learning/communicating need to be further explored to make this learning component accessible to a wider audience.

Specialised Skill Development
Special skill development in business will be most effective if placed in an overall paradigm of value creation across the demand chain. For example, specialised skills in accounting can be traditionally subdivided into financial and managerial accounting skills. In the new business-learning environment, such specialised skills may be better placed in the relevant overall business model. For example, detailed cost accounting skills such as target costing, functionality-price-quality trade-offs, inter-organisational cost investigations, concurrent cost management, and Kaizen costing can be better put in perspective, when positioned and illustrated with respect to where in the overall value adding process these skills are of importance. Subsequently, these skills and tools may be put in perspective in relation to inter-firm performance measurement across the demand chain, etc. In other words, in this example the overall business model (paradigm) drives additional skill creation of learners, not the functional area of accounting. Specialised skills may be developed around business issues, rather than separate subjects, presenting new challenges to relevant education providers.

Integrated software as an enabler for learning
Today's business models (supply chain/demand chain) are supported by advanced software, such as Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and collaborative commerce- software interfaces. It should not be the aim to make business students experts on a number of systems. This is beyond the scope of any business curriculum, and cannot be the aim due to continually changing software

releases. However, a lot more can be done to create a much better awareness of the underlying realities managers confront while running these systems in their companies, while also pointing out underlying weaknesses of systems from a business research perspective. This may, for example, relate to capacity calculations within a software application, where the method of capacity calculation is not elaborated on in the software interface, but can be part of the business school learning process. Exposure to real-world systems that underpin these emerging business models and paradigms, will only aid in the learning process, and create critical and better prepared future users. While a number of predominant business schools already enjoy this type of collaboration, such software solutions should become more readily available in the business educational process.

The emergence of enhanced knowledge management systems

Thus far the discussion focused on changes in the general business environment and the resulting paradigm shift, and how modern business education may respond to these changes in a demand chain-driven learning framework. In this section we address the integration of e-knowledge networks in varied e-business distribution channels, and how they may impact collaborative business learning.

Four major categories of e-knowledge networks can be identified:

- supply chain management networks
- adserver network
- content syndication networks
- B2B exchange networks

Each of these developments is briefly discussed below:

Supply Chain Management Networks

Progressive supply chain management encompasses the planning, directing, and controlling of the flow of products, services, and information from s firm's suppliers' suppliers to its customers' customers, through intermediaries such as distributors and retailers. The purpose is to coordinate activities "across the supply chain to create value for customers, while increasing the profitability of every link in the chain (Anderson et. al., 1997). This coordination aspect addresses the role of shared knowledge that enables the analysis and management of all supply chain activities. From a knowledge management perspective, the nature of information exchange between supply chain partners has evolved from limited, or narrowly defined, information sharing (such as inventory records) to sharing of rich knowledge between partners. In fact, as opposed to the traditional view of the supply chain as a network of entities through which materials flow from suppliers to consumers, the management of bi-directional flows of information and knowledge is now being recognised as the most important aspect of managing the supply chain (Lummus and Vokurka, 1999). More recently, networks of supply chain partners have created richer environments for knowledge exchange to enhance the overall efficiency of the entire network for all partners, thereby reducing the well-known "bullwhip effect" (where small fluctuations at one contact point become exaggerated as each player's system overreacts to small changes in demand) created by poor transfer of demand knowledge (Warkentin et. al., 2000). Burn and Hackney (2000) present a three stage "chain" analysis model, whereby they extend the supply chain concept to incorporate value and demand chain models, and do so in a non-linear fashion (allowing

for bi-directional flows of information). As such, e-knowledge networks enable significant new inter-organisational flows of information and knowledge that facilitate demand chain management.

These evolutions prompt changes in how learning needs to take place in the new business education setting. Students would need to learn how to use and leverage cross-functional "rich" information obtained in this fashion to create competitive advantage for the company. Often, the emphasis is too much on reengineering existing processes, rather than on innovating new ones. Business education should embrace these knowledge network developments within the demand chain to obtain a more holistic reference framework from which to initiate these innovation projects for a particular industry. Many universities have embraced this idea with the setting up of incubator projects with industry, where failure is allowed and considered part of the learning process. From a knowledge management perspective, it is important that universities and institutions of higher learning recognise these e-knowledge networks, and do not drive these projects solely based on the expertise of the hosting institution.

Adserver networks

Another new category of e-knowledge networks is the Internet advertising network companies (or "adservers"), which are firms that create business networks to aggregate the supply and demand for online advertising. As such, the adserver plays the role of an infomediary. The knowledge transfer that results is more than a two-way exchange between consumer and seller. It is more than a three-way exchange between consumer (client PC), the website (s)he visits, and the adserver. It is, in fact, an n-way exchange between the consumer, the adserver, and perhaps thousands of other websites that collaborate in this network. Adserver technology employs both Boolean decision rules and stochastic processes to determine the appropriate digital advertising content to deliver to the server, in order to deliver to a specific viewer. Knowledge is hereby transferred from the user's cookie file (small code left on the user's computer that is used to look up information on an e-business database, in order to retrieve information on past actions, search interests, past purchases etc,) to the adserver's data mining system, which processes that knowledge utilising specific business rules.

It is clear that business education will need to address these new forms of automated knowledge gathering, in relation to creating marketing advantage, privacy issues, information technology, and statistical processing, among others.

Content Syndication Networks

A third category of e-knowledge networks involves the syndication of content across a network of a myriad related or unrelated websites through content-mediaries. Syndication network organisers face the knowledge engineering challenge of synchronising their technology with a wide variety of sources and destinations, as they deal in every possible kind of digital media, from text to graphics to audio and video streaming (Werbach, 2000). The key issue regarding this type of e-knowledge networks is to provide engaging content, and to have an appropriate knowledge infrastructure that has a high degree of situational awareness. These networks were not possible a few years ago because of

lacking technology, and offer rich interactive relationships that can benefit modern business education. In particular, the use of content syndication networks may be useful in areas such as retail management education (to offer content related to products offered for sale).

B2B Exchange Networks
Most of today's B2B activity falls within the category of vortals (vertically integrated portals that serve a given industry) that dynamically match buyers and sellers in an e-procurement environment, where buyers and sellers are aggregated. Kaplan and Sawhney (2000) claim that those vortals that allow matching have a crucial edge over those that merely aggregate. Improved information and knowledge, say about individual buyers' financing and logistics needs, leads to more efficient markets for the benefit of all participants. These type of networks may become an enabler for making a number of existing markets more efficient, prompting partners, in many cases, to alter their procurement practices to leverage the benefits of rich knowledge exchange for long-term success. These developments and enabling "market making" technologies should become a standard part of the business education program.

From the above discussions it seems clear that, as the Internet expands its reach, along with automated information sharing capabilities, the ability to create knowledge-based networks of partners will be critical to maintaining competitive advantage.

Conclusions
Many of today's evolutions in business management, characterised by new ways of knowledge creation in a collaborative, multi-disciplinary environment, are not yet adequately reflected in business college education. This paper outlined a generic framework in which business education can align itself better with emerging (learning) needs of the market place. It was suggested to address these issues along dimensions of demand chain management and emerging business models, dynamic performance measurement (both in business and university settings), and a cross-functional approach to learning. Furthermore, a need was identified to expose business students to modern business software interfaces, and a critical analysis of the underlying methodologies used in these systems. The paper then identified a number of evolving automated information sharing capabilities, which through the creation of knowledge-based networks of partners, can be deployed in the business educational process.

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